

REMARKS

In response to the Office Action mailed February 9, 2000, Applicants respectfully request reconsideration. To further the prosecution of this application, the objections and rejections recited in the Office Action are addressed below. The claims as presented are believed to be in allowable condition.

Withdrawal of Finality

Applicants thank the Examiner for reconsidering and withdrawing the finality of the previous office action.

¶112 Rejections

The Examiner rejected claim 59 as being indefinite for failing to establish an antecedent basis for the Markush group phrase “the group consisting of” in line 8. However, Applicants’ use of the phrase “the group consisting of” is consistent with the commonly accepted form of Markush groups recognized by the USPTO, as indicated in MPEP 2173.05(h). Applicants submit that the claim as drafted is not indefinite.

Rejections over the Prior Art

In ¶s 6-18 of the Office Action, claims 1-61 are rejected under 35 U.S.C. §102 or §103 as being unpatentable over U.S. Patent No. 5,991,813 (Zarrow), either alone or in combination with other references. Each of independent claims has been amended to clearly distinguish over Zarrow.

Claim 1

Claim 1 has been amended to recite the feature previously recited in claim 10. As amended, claim 1 is directed to a computer system including a central processing unit (CPU), a first storage system, a second storage system, at least one communication link, and a mirroring controller. The first storage system is coupled to the CPU to store information written from the CPU. The mirroring controller is responsive to the information being written from the CPU to the first storage system to mirror at least some of the information written from the CPU to the first storage system in the second storage system. The communication link couples the second storage system to the CPU, and includes a network cloud that is shared with at least one other resource so that no portion of the

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network cloud is dedicated exclusively to transferring information between the CPU and the second storage system. The communication link extends between the first and second storage systems such that the second storage system is coupled to the CPU via the first storage system.

Claim 1 is rejected as being anticipated by Zarrow. However, the architecture of Zarrow's system is different from that recited in the amended claim 1. In Zarrow, the host computer 10 accesses the remote computer 12 and its storage device 18 directly, rather than via a storage system. In contrast, in the amended claim 1, the CPU is coupled to the second storage system via the first storage system. Zarrow does not teach or suggest such an arrangement. In fact, it is believed that the storage devices in Zarrow do not permit such an arrangement. Zarrow teaches that the local storage device 16 is "a disk drive or a tape device" (col. 2, lines 56). Such a device typically cannot be connected to a remote storage device via a network cloud so as to allow the remote storage device to be coupled to the local CPU. In contrast, in claim 1, the first storage device is capable of being coupled to the second storage device via a communication link including a network cloud, such that the second storage device is coupled to the CPU via the first storage system. Zarrow does not suggest the computer system of claim 1. Claim 1 is therefore patentable over Zarrow.

Claims 2-21 depend from claim 1 and are patentable for at least the same reasons.

Claim 22

Claim 22 has been amended to recite the features previously recited in claim 24. As amended, claim 22 is directed to a computer system including a central processing unit (CPU), a first storage system, a second storage system, at least one communication link, and a mirroring controller. The first storage system is coupled to the CPU to store information written from the CPU. The mirroring controller is responsive to the information being written from the CPU to the first storage system to mirror at least some of the information written from the CPU to the first storage system in the second storage system. The communication link couples the second storage system to the CPU. The communication link includes at least one wireless connection, and extends between the first and second storage systems such that the second storage system is coupled to the CPU via the first storage system.

Claim 22 is rejected as being obvious over Zarrow in view of U.S. Patent No. 5,212,784 (Sparks). Neither Zarrow nor Sparks, either alone or in combination, discloses a system that includes a CPU coupled to a second storage system via a first storage system and a wireless

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communication link, as recited in the amended claim 22. As discussed in connection with claim 1, in Zarrow's system, the computer 10 directly accesses the remote computer 12 and its storage device 18. Hence, Zarrow fails to teach the system cited in claim 22. Sparks in turn fails to provide any teaching or suggestion with respect to coupling a CPU to a second storage system via a first storage system, as Sparks is merely cited for its teaching in using a wireless connection as a communication link in a backup system. Therefore, neither Zarrow nor Sparks, either alone or in combination, discloses coupling a CPU to a second storage system via a first storage system and a wireless communication link. Claim 22 is therefore patentable over Zarrow in view of Sparks.

Claims 23-30 depend from claim 22 and are patentable for at least the same reasons.

Claim 31

Claim 31 has been amended to recite the features previously recited in claim 36. As amended, claim 31 is directed to a computer system including a central processing unit (CPU); first, second, and third storage systems; first, second, and third communication links; and a mirroring controller. The first storage system is coupled to the CPU via the first communication link to store information written from the CPU. The mirroring controller is responsive to the information being written from the CPU to the first storage system to mirror at least some of the information in the second and third storage systems. The second communication link couples the second storage system to the CPU and extends between the first and second storage systems such that the second storage system is coupled to the CPU via the first storage system. Similarly, the third communication link couples the third storage system to the CPU and extends between the first and third storage systems such that the third storage system is coupled to the CPU via the first storage system.

Claim 31 is rejected as being obvious over Zarrow in view of Sparks. However, neither Zarrow nor Sparks, either alone or in combination, teaches coupling a CPU to two storage systems via a first storage system, as recited in the amended claim 31. As discussed in connection with claim 1, in Zarrow's system, the computer 10 directly accesses the remote computer 12 and its storage device 18. Sparks in turn is cited for the alleged teaching of using a second back up drive, not coupling two storage systems to a CPU via a first storage system, as recited in claim 31. Claim 31 is therefore patentable over Zarrow.

Claims 32-36 depend from claim 31 and are patentable for at least the same reasons.

Claim 37

Claim 37 is directed to a method of operating a computer system that includes a central processing unit (CPU); first, second, and third storage systems; first, second, and third communication links; and a mirroring controller. The first storage system is coupled to the CPU via the first communication link to store information written from the CPU. The second communication link couples the second storage system to the CPU and extends between the first and second storage systems such that the second storage system is coupled to the CPU via the first storage system. Similarly, the third communication link couples the third storage system to the CPU and extends between the first and third storage systems such that the third storage system is coupled to the CPU via the first storage system. According to the recited method, in response to information being written from the CPU to the first storage system, at least some of the information is mirrored in both the second and third storage systems.

Claim 37 is rejected as being obvious over Zarrow in view of Sparks. However, as discussed in connection with claim 37, neither Zarrow nor Sparks, either alone or in combination, discloses coupling a CPU to two storage systems via a first storage system, as recited in the amended claim 37. Therefore, the combination of Zarrow and Sparks does not disclose the method of claim 37. Claim 37 is therefore patentable over Zarrow in view of Sparks.

Claim 38 depends from claim 37 is patentable for at least the same reasons.

Claim 39

Claim 39 is directed to a method of mirroring information stored in a computer system. The computer system includes a central processing unit (CPU), a first storage system that is coupled to the CPU to store information written from the CPU, and a second storage system coupled to the CPU by at least one communication link. The communication link includes a network cloud that is shared with at least one other resource so that no portion of the network cloud is dedicated exclusively to coupling the second storage system to the CPU. The communication link extends between the first and second storage systems such that the second storage system is coupled to the CPU via the first storage system. According to the recited method, in response to the information being written from the CPU to the first storage system, at least is transmitted into the network cloud with the second storage system designated as a destination, so that the at least some of the

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information can be transferred through the network cloud and mirrored in the second storage system.

Claim 39 is rejected as being anticipated by Zarrow. However, as discussed in connection with claim 1, in Zarrow the host computer 10 accesses the remote computer 12 and its storage device 18 directly, rather than via a storage system. Therefore, Zarrow does not teach or suggest the method recited in claim 39. Claim 39 is therefore patentable over Zarrow.

Claims 40-46 depend from claim 39 and are patentable for at least the same reasons.

Claim 47

Claim 47 has been amended to recite the feature previously recited in claim 51. As amended, claim 47 is directed to a computer system capable of mirroring information in a remotely disposed target storage system that is coupled to the computer system via at least one communication link that includes a network cloud that is shared with at least one other resource. The computer system includes a central processing unit (CPU) coupled to the network cloud, a source storage system that is coupled to the CPU to store information written from the CPU, and a controller. The controller is responsive to the information being written from the CPU to the source storage system to transfer at least some of the information written from the CPU into the network cloud so that the at least some of the information can be mirrored in the target storage system. Claim 47 has been amended to recite that the communication link extends between the source and target storage systems such that the CPU is coupled to the network cloud via the source storage system.

Claim 47 is rejected as being anticipated by Zarrow. As discussed in connection with claim 1, in Zarrow the host computer 10 accesses the remote computer 12 and its storage device 18 directly, rather than via a storage system. Therefore, Zarrow does not teach or suggest the computer system recited in claim 47. Claim 47 is therefore patentable over Zarrow.

Claims 48-52 depend from claim 47 and are patentable for at least the same reasons.

Claim 53

Claim 53 is directed to a computer system capable of mirroring information in a remotely disposed target storage system that is coupled to the computer system via at least one communication link that includes a wireless connection. The computer system includes a central

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processing unit (CPU) coupled to the communication link, a source storage system that is coupled to the CPU to store information written from the CPU, and a controller. The controller is responsive to the information being written from the CPU to the source storage system to transfer at least some of the information written from the CPU into the communication link so that the at least some of the information can be mirrored in the target storage system. Claim 53 has been amended to recite that the communication link extends between the source and target storage systems such that the CPU is coupled to the communication link via the source storage system.

Claim 53 is rejected being as obvious over Zarrow in view of Sparks. As discussed in connection with claim 22, neither Zarrow nor Sparks, either alone or in combination, discloses coupling a CPU to a second storage system via a first storage system and a communication link including a wireless connection. Claim 53 is therefore patentable over Zarrow in view of Sparks.

Claims 54-55 depend from claim 53 and are patentable for at least the same reasons.

Claim 56

Claim 56 has been amended to recite the features previously recited in claim 57. As amended, claim 56 is directed to a computer system including a central processing unit (CPU), a first storage system, a second storage system, at least one communication link, and a mirroring controller. The first storage system is coupled to the CPU to store information written from the CPU. The mirroring controller is responsive to the information being written from the CPU to the first storage system to mirror at least some of the information written from the CPU to the first storage system in the second storage system. The communication link couples the second storage system to the CPU. The communication link includes at least one communication link selected from the group consisting of an Ethernet link, an asynchronous transfer mode (ATM) link, an FDDI link and a fibre channel link. This communication link extends between the first and second storage systems such that the second storage system is coupled to the CPU via the first storage system.

Claim 56 is rejected as being obvious over Zarrow in view of U.S. Patent No. 5,537,533 (Staheli). Neither Zarrow nor Staheli, either alone or in combination, discloses coupling a CPU to a second storage system via a first storage system and one of the communication links specifically recited in the amended claim 56. As discussed in connection with claim 1, in Zarrow's system, the computer 10 directly accesses the remote computer 12 and its storage device 18. Hence, Zarrow fails to teach the system cited in claim 56. Staheli in turn fails to provide any teaching or suggestion

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with respect to coupling a CPU to a second storage system via a first storage system. Sparks is merely cited for its alleged teaching of using Ethernet links, asynchronous transfer mode (ATM) links, FDDI links or fibre channel links in backup systems. Thus, neither Zarrow nor Staheli, either alone or in combination, discloses coupling a CPU to a second storage system via a first storage system and one of the recited communication links. Claim 56 is therefore patentable over Zarrow in view of Staheli.

Claims 57-58 depend from claim 56 and are patentable for at least the same reasons.

Claim 59

Claim 59 has been amended to recite the features previously recited in claim 60. As amended, claim 59 is directed to a computer system including a central processing unit (CPU), a first storage system, a second storage system, at least one communication link, and a mirroring controller. The first storage system is coupled to the CPU to store information written from the CPU. The mirroring controller is responsive to the information being written from the CPU to the first storage system to mirror at least some of the information written from the CPU to the first storage system in the second storage system. The communication link couples the second storage system to the CPU, and includes at least one communication link selected from the group consisting of a packet switched network and a cell switched network. This communication link extends between the first and second storage systems such that the second storage system is coupled to the CPU via the first storage system.

Claim 59 is rejected as being obvious over Zarrow in view of Black, U. D., "Computer Networks: Protocols, Standards, and Interfaces," 2d ed., 1993 (Black). However, neither Zarrow nor Black, either alone or in combination, teaches coupling a CPU to a second storage system via a first storage system and one of the types of communication links recited in claim 59. As discussed in connection with claim 1, in Zarrow's system the computer 10 directly accesses the remote computer 12 and its storage device 18. Hence, Zarrow fails to teach the system cited in claim 59. Black in turn fails to provide any teaching or suggestion with respect to coupling a CPU to a second storage system via a first storage system, as Black is merely cited as teaching packet switched networks and cell switched networks. Neither Zarrow nor Black, either alone or in combination, discloses coupling a CPU to a second storage system via a first storage system and one of the communication links recited in claim 59. Claim 59 is therefore patentable over Zarrow in view of Black.

Claim 60 depends from claim 59 and is patentable for at least the same reasons.

Claim 61

Claim 61 is directed to a computer system including a central processing unit (CPU), a first storage system, a second storage system, at least one communication link, and a mirroring controller. The first storage system is coupled to the CPU to store information written from the CPU. The mirroring controller is responsive to the information being written from the CPU to the first storage system to mirror at least some of the information written from the CPU to the first storage system in the second storage system. The communication link couples the second storage system to the CPU and includes a network cloud. The communication link extends between the first and second storage systems such that the second storage system is coupled to the CPU via the first storage system.

Claim 61 is rejected as being anticipated by Zarrow. As discussed in connection with claim 1, in Zarrow the host computer 10 accesses the remote computer 12 and its storage device 18 directly, rather than via a storage system. Therefore, Zarrow does not teach or suggest the method recited in claim 61. Claim 61 is therefore patentable over Zarrow.

Claim 67 depends from claim 61 is patentable for at least the same reasons.

Claim 62

Newly added independent claim 62 is directed to a computer system that includes a central processing unit (CPU), a first storage system that is coupled to the CPU to store information written from the CPU, a second storage system, at least one communication link coupling the second storage system to the CPU, and a mirroring controller. The mirroring controller is responsive to information being written from the CPU to the first storage system to mirror at least some of the information written in the second storage system by transferring the at least some of the information through the communication link. The communication link includes a network cloud that is shared with at least one other resource so that no portion of the network cloud is dedicated exclusively to transferring information between the CPU and the second storage system. The communication link includes a plurality of communication paths from the CPU to the network cloud, so that a plurality of packets of information can be transferred from the CPU to the second storage system in parallel through the network cloud.

Claim 6 included subject matter similar to claim 62, and was rejected as being obvious over Zarrow in view of Staheli. The Examiner acknowledged that “Zarrow does not explicitly disclose using a plurality of communication paths for parallel transfer of packets.” However, the Examiner asserted that at col. 10, lines 52-63, Staheli discloses “using a plurality of communication paths for parallel transfer of packets.” Applicant respectfully disagrees. At col. 10, lines 52-63, Staheli teaches a system that includes “four parallel processors 60, which are individually labeled T1 through T4 in FIG. 2.” These are parallel processors which work with one another to process data and generate packets for transferring the data over a single communication link 50 (col. 12, lines 3-63). These processors are not communication paths which enable transmitting information from a CPU to a storage system in parallel through a network cloud, as is recited in claim 62. Thus, even if Zarrow and Staheli were combined, the combination would not result in the computer system recited in claim 62. Claim 62 is therefore patentable over Zarrow in view of Staheli.

Claim 63 depends from claim 62 and is patentable for at least the same reasons.

Claim 64

Newly added independent claim 64 is directed to a method of mirroring information stored in a computer system that includes a CPU, a first storage system that is coupled to the CPU to store information written from the CPU, and a second storage system coupled to the CPU by at least one communication link. The communication link includes a network cloud that is shared with at least one other resource so that no portion of the network cloud is dedicated exclusively to coupling the second storage system to the CPU. According to the recited method, in response to information being written from the CPU to the first storage system, at least some of the information is transmitted into the network cloud with the second storage system designated as a destination for the at least some of the information, so that the at least some of the information can be transferred through the network cloud and mirrored in the second storage system. In transmitting the information, a plurality of packets of the at least some of the information is transmitted in parallel from the CPU to the network cloud.

Claim 42 included subject matter similar to claim 64, and was rejected as being obvious over Zarrow in view of Staheli. However, as discussed in connection with claim 62, neither Zarrow nor Staheli, either individually or in combination, teaches transmitting information to be mirrored in a

second storage system in parallel over multiple paths from a CPU to a network cloud. Claim 64 is therefore patentable over Zarrow in view of Staheli.

Claim 65 depends from claim 64 and is patentable for at least the same reasons.

Claim 66

Newly added independent claim 66 is directed to a computer system capable of mirroring information in a remotely disposed target storage system that is coupled to the computer system via at least one communication link including a network cloud that is shared with at least one other resource. Th computer system includes a CPU, a source storage system that is coupled to the CPU to store information written from the CPU, and a controller. The controller is responsive to the information being written from the CPU to the source storage system to transfer at least some of the information written from the CPU into the network cloud so that the at least some of the information can be mirrored in the target storage system. The CPU is coupled to the network cloud through a plurality of communication paths so that a plurality of packets of the information can be transferred from the CPU to the target storage system in parallel through the network cloud.

Claim 50 included subject matter similar to claim 66, and was rejected as being obvious over Zarrow in view of Staheli. However, as discussed in connection with claim 62, neither Zarrow nor Staheli, either individually or in combination, teaches transmitting information to be mirrored in a target storage system in parallel over multiple paths from a CPU to a network cloud. Claim 66 is therefore patentable over Zarrow in view of Staheli.

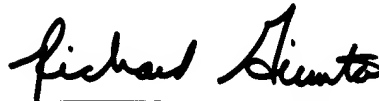
Conclusion

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to contact the Applicants' attorney at the number listed below to discuss any outstanding issues relating to the allowability of the application.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to deposit account No. 23/2825.

Respectfully submitted,

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